

Louisiana Department of Health & Hospitals
Office of Public Health - Molluscan Shellfish Program
Application to the Louisiana Innovative Technology Grant Fund
August 12, 2003

I. PROJECT TITLE: Molluscan Shellfish Harvest Site Locator Classification, Charting, and Regulation of Louisiana Oyster Production Zones with Global Position System Technology

II. PROJECT LEADER:

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III. EXECUTIVE SUMMARY:

The Louisiana Department of Health and Hospitals (DHH), Office of Public Health, in alliance with the Louisiana Department of Wildlife and Fisheries (LDWF), and the Louisiana oyster industry through the Louisiana Oyster Task Force, is submitting this request for a project intended to make use of pocket personal computers ("pocket pc's") to capitalize on geographical information system (GIS) and global position system (GPS) technology to locate potential oyster harvest areas along our vanishing coastal waters. It is envisioned that the technology will serve the informational needs of all aforementioned parties, and be applied to oyster harvesting locations in Louisiana's coastal waters. The grant money would purchase the pocket pc equipment for both agencies, pilot the use of pc units by the oyster fishermen, and fund the software development and integration by a contractor. This pocket pc would combine the oyster lease maps maintained by Wildlife and Fisheries and the harvest area classification maps produced by the Department of Health and Hospitals into a GIS that could be used by the entire oyster industry and by other State agencies. The instruments' greatest value would be to give exact GPS locations on the reference map when used in coastal waters. This would provide oyster harvest vessels operating in the Gulf of Mexico with the ability to easily and accurately locate their harvest lease and determine if the waters are open for harvest. The pocket pc's would also be used by field staff for other work elements (reports, surveys, etc.) exclusive to Wildlife & Fisheries, and for shellfish surveys and sample collection exclusive to DHH. Grant funds would also be applied to fund any expenses incurred to ensure that the GIS systems are interagency-compatible. It is also foreseen that a website would be created to make the information available to the public. The information on the website could also be downloaded to the pocket pc's. Funds in the amount of \$252,840.00 are being sought to implement this project, which has an anticipated operational date of September 1, 2004.

IV. DESCRIPTION OF THE PROJECT:

A. Project Narrative

Louisiana Revised Statute 40:5.3 charges the Department of Health and Hospitals with the responsibility for the classification of Louisiana's shellfish growing areas (SGA) as to their suitability for harvest. It further requires this classification be in conformity with the requirements of the National Shellfish Sanitation Program (NSSP). The compliance with this NSSP program allows Louisiana oyster fishermen to market their products in interstate commerce, a considerable enterprise as Louisiana markets 75% of its oysters out-of-state. Under the direction of Sanitarian Services, the Molluscan Shellfish Program (MSP), formerly known as the Oyster Water Monitoring Program (OWMP) was organized. The La. Dept. of Wildlife and Fisheries was empowered with the responsibility of enforcement of the oyster harvest classification areas established by DHH. The DHH currently reclassifies coastal waters four

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times per year to account for changing water conditions seasonally, in an effort to ensure that waters are safe for harvest. Currently, over sixty sets of ten-page maps are being produced and distributed to public posting sites per harvest season. The maps, approximately 3'x 4', are distributed to Wildlife and Fisheries, and to the oyster fishermen, for the purpose of identifying harvest areas on the basis of recognizable geographic features. These maps are bulky because of their size and volume and are hard to use while on the water. Coastal land loss, resulting in the obliteration of the recognizable geographic landmarks, has severely compromised the utility of these maps. As a result, the ability for the fishermen to recognize open harvest areas is hampered, as is LDWF's ability to enforce closed harvest areas. The technology which would be funded by this grant would potentially increase the size of harvest areas available to the oyster fishermen, and the current reliance on diminishing geographical landmarks to identify the harvest boundaries would no longer be a basis for closure line decisions.

Grant funding will be used to produce customized map programs (GIS) viewed on the pocket pc's. The pocket pc's will be equipped with global positioning and tracking (GPS). This combination of technologies will allow the user to identify with pinpoint accuracy their location in relation to harvest sites while navigating in coastal waters. This feature will enhance the MSP's ability to protect public health by providing tools that allow consistent location of bacteriologically safe oyster harvest sites. This will reduce the incidence of potentially deadly foodborne illness associated with the consumption of oysters harvested from unsafe or unclassified waters. Additionally, the quality of information on point sources of pollution in oyster production waters will be improved.

Thus, pocket pc computer equipment is the key to realizing the goals of the MSP: to protect public health, help prevent the spread of shellfish-related foodborne diseases, identify oyster leases, and to enforce regulations in oyster harvest areas.

B. Use of Innovative Technology

The emergence of hand-held portable computing device technology has made possible a number of attractive possibilities for field professionals as they perform investigative functions in a variety of public or remote settings. It means that a high degree of confidence can be placed in one's location, thus helping to ensure that harvesting activities take place only in those areas where permitted. Downloading of the data is efficiently performed by linkage with a central computer where the program database resides. Such paperless technology is environmentally friendly. It also avoids the pitfalls of multiple data entering. *The software to be developed under the aegis of the Innovative Technology fund would allow Louisiana to be the first state to apply this approach to field problems associated with oyster harvest and regulation.* It is envisioned that twenty-four hand-held units would be apportioned to LDHH and LDWF, and that 48 units would be distributed to oystermen and to members of the Louisiana Oyster Task Force, an industry group, for introduction to the industry and evaluation.

C. Multi-agency Application

Oyster regulation in Louisiana is divided between DHH and LDWF. DHH is responsible for monitoring the water quality in the oyster production areas, while LDWF handles enforcement. Thus, the grant-funded project would involve both agencies. The information on oyster leases, classification lines, public seed grounds, and harvest areas would be shared between the two

agencies and with the public, via the website, in a manner heretofore impossible. The end result will be an enhancement of the efforts of both agencies.

D. Best Practice References

Global position system technology is currently being used in underwater surveying and exploring; commercial and sport fishing; and in commercial shipping, both on-board and in navigation aids such as buoys. These applications of the technology are similar to the proposed work in that they produce highly reliable and reproducible information on locations in bodies of water. *GPS Video Overlay Systems' Sea-Trak™* (<http://www.gps-system.com>) produces quantitative data superimposed on video underwater images. This application closely matches the idea which DHH and LDWF are attempting to actualize with the grant funds.

E. Long-range Planning

The MSP will continue its efforts to improve data management, analysis, and reporting. The requested funds will advance this ongoing effort. The MSP is currently using a CAD-based GIS system, which replaced earlier hand entries in log books and manual statistical analysis. The MSP will continue its efforts to improve mapping capabilities by updating base maps to more accurately represent the true features of the dynamic coastline. By integrating analysis results with the upgraded maps, decision makers will have ready access to critical information. Additionally, improved maps will be compatible with the maps of Louisiana's other natural resource regulatory agencies.

Some coastal areas consistently have good water quality and are always open, while others with poor quality are always closed. Located between the two are areas in which water quality is variable, fluctuating within seasons and among years. Enhanced technology will enable DHH to find new ways to meet its mandate to protect public health and focus its sampling efforts on the variable-quality regions. Water quality conditions are also influenced by coastal restoration projects such as the Davis Pond Freshwater Diversion Project. These projects create challenging conditions for the oyster industry. The grant funds will enable DHH and LDWF to manage coastal restoration areas.

Currently, the MSP is using the requirements found in the Interstate Shellfish Sanitation Conference model ordinance to determine shellfish water management status. Future exploration of alternative decision rules will be considered and evaluated. DHH currently produces closure lines based on enforceability, that is to say that the closure lines must be drawn to the nearest identifiable coastline feature so the fishermen and LDWF can identify the harvest area. This new technology, if accepted by oyster fishermen, will reduce the reliance on observed geographical features. The result may drastically increase the potential for opening of more harvest areas.

Cooperation between DHH and LDWF on oyster regulatory and enforcement issues will continue to be of paramount importance. Improved cooperation will result from integrating DHH closure maps with LDWF lease maps to quickly identify lease status of any given location.

Improved communication with the public will be the result of posting pertinent GIS information maps on a website.

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F. Performance Goals

Performance Indicator 1: Locate bacteriological water sample points with confidence - survey users at six months and again at one year; modify as needed.

Performance Indicator 2: LDWF personnel use the data for enforcement purposes - survey users at six months and again at one year; modify as needed.

Performance Indicator 3: Oyster harvest sites (four seasonal classification maps) are delimited with greater confidence - survey users at six months and again at one year; modify as needed.

G. Technical Approach

1. Technical Description – (refer to Fig. 1)

Components:

Hardware - pocket pc's with memory sticks and GPS receivers for oyster fishermen, MSP and LDWF personnel; internet server.

Software - software to accomplish data formatting and transfer to GPS receivers and Windows CE platform on pocket pc's; software for internet server.

Process:

MSP sample collection will be accomplished by surveying all current stations using GPS and the resurveyed locations will be used as the basis for future closure maps. Sample locations will be stored in the pocket pc's as a map layer that will show in the background, with a current satellite image also available as a background layer to facilitate navigation to sample locations. The sampler's location will be displayed on the pocket pc on these map layers allowing consistent collection at the same location through time within 50 feet of the mapped location. The laboratory results of the water quality are then used to predict the safety of the growing waters, and the program plots the open and closed harvest areas.

Once MSP publishes a seasonal classification map, the map will be transferred to LDWF for display on their website with their lease data. MSP will also publish classification maps on a website they will maintain, which will provide access to additional information on oyster water quality. This integration of now-separate data base information will provide the oystermen with direct information on the status of their lease as well as public seed grounds. This will eliminate the confusion of multiple maps and misinterpretation.

Digital classification maps will be transferred by MSP to the internet sever. The maps will be available for download. Oystermen will be selected by the Oyster Task force for participation to receive handheld GPS unit for a period of one year. During that time the transfer between MSP and oystermen by means of downloadable website files will be evaluated.

2. Interoperability – The system will use widely used, commercially available software, which will allow data exchange with other state agencies, researchers, and the general public. The mapping software is capable of producing map files in a broad range of formats, which will facilitate data transfer to the widest range of users.

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3. Scalability – It is anticipated that the pocket pc's will be programmed to enhance and support field data collection of spatially oriented data. It is anticipated that MSP will use the system to route sample collection. MSP also anticipates using the handheld units to collect sanitary survey data, and upload those data to their GIS system. It is also anticipated that basic data capture screens will be developed for LDWF enforcement personnel.
4. Maintaining the System – The technology to be used for this project is the most current. By using widely available commercial software, upgrading in the future will be routine and cost-effective. Additionally, support services are anticipated for all users and technical support is necessary for the success of the project.

H. Implementation Approach

It is envisioned that a pilot program of this proposal could be functional by September 1, 2004. The program would begin with the acquisition of a contractor to integrate the DHH and LDWF geographical information mapping system, and to develop the software to combine the GIS with GPS on the pocket pc's. A website would also be developed for internet users to acquire the combined DHH classification and area maps along with other LDWF maps in a format downloadable and usable in pocket pc technology. A pilot program would be conducted through August, 2005 with the use of the pocket pc's; however, the informational portion and maps would be available for the public by website access by September, 2004. At the end of the pilot program, it will be evaluated to determine the acceptance of the technology by the oyster fishermen.

I. Assessment of Risks

1. Equipment durability in the field is assigned a low risk due to relatively low cost of equipment.
2. Scheduling and data transfer between MSP and LDWF pose a moderate risk in that project success is potentially limited by this interaction. Interagency agreement and resulting protocols will reduce the likelihood of negative consequences.
3. The transfer of classification maps to oystermen's units will be fully supported by phone support. This portion of the project carries the greatest risk.
4. The overall program risk is deemed minimal. Even under the worst-case scenario of complete project failure, the current system will continue to operate.

J. Integration with Existing Technologies

The wide applications of geo-reference technology have become commonplace. GPS units are standard equipment on some automobiles. Its use in nautical navigation has become common. The GPS receiver can be added to pocket pc's, which have the memory capacity to hold map data to link with the GPS receiver information. LDWF and DHH are currently using CAD-based GIS to produce classification and lease maps for the industry. This proposal links all of these technologies together to produce more accurate location information.

K. Project Budget

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Equipment

Pocket pc's for MSP and LDWF personnel, and for oystermen and Task Force; 72 total units; per unit costs as follows:

Pocket pc	\$450.00
GPS unit	250.00
Memory cards, two, 128 mb	400.00
Expansion cards	<u>200.00</u>
Total per unit	\$1,300.00 X 72 units = \$93,600.00
Cables and card readers	1,000.00
Server	12,000.00

Total Equipment costs ***\$106,600.00***

Software

Internet software	5,000.00
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Total Software costs ***\$5,000.00***

Professional/Contract Services

Initial configuration and pocket pc setup	\$8,000.00
Development of PDA data transfer protocols	10,000.00
Development of background images	5,000.00
Training - six 4-hr. sessions	7,040.00
Support - 200 hrs	16,000.00
Compile reports and final results	21,000.00
Development of protocols for exchange of GIS data	12,200.00
Database composition	5,000.00
Website design	7,000.00
Website support and periodic upgrades	10,000.00
Administrative costs	40,000.00

Total Professional/Contract Services ***\$141,240.00***

L. Funding Requested

<u>Category</u>	<u>Total Cost</u>	<u>Other Sources</u>	<u>Funding Requested</u>
Equipment	\$106,600.00	-0-	\$106,600.00
Software	5,000.00	-0-	5,000.00
Professional/Contract	141,240.00	-0-	141,200.00
Total	\$252,840.00	-0-	\$252,840.00

M. Cost/Benefit Analysis

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Implementation of the program would reduce the ever-increasing number of inquiries from oystermen to DHH and LDWF who are having difficulty finding leases and identifying open harvest areas. Also, improved locating procedures will likely have a positive impact on the incidence of oyster-borne illnesses, the resulting losses in income to effected individuals, as well as lower medical expenses used to treat these illnesses.

Fiscal Note

<u>State Costs</u>	<u>2003-04</u>	<u>2004-05</u>	<u>2005-06</u>
Personnel	\$20,000	\$10,000	\$10,000
Operating Services	-0-	-0-	-0-
Professional Services	35,000	35,000	31,240
Equipment	106,600	4,500 ^a	500
Supplies	-0-	-0-	-0-
 Total	 \$161,600	 \$49,500	 \$41,740

^a To provide for as many as five replace units in case of loss or damage.

Means of Financing for Above Expenditures

<u>Fiscal Year</u>	<u>State Gen. Fund</u>	<u>Agency Self-Generated</u>	<u>Restricted/ Other (specify)</u>	<u>Federal Funds</u>	<u>Local Funds</u>
2003-04	-0-	-0-	\$161,600 ^a	-0-	-0-
2004-05	\$4,500	-0-	45,000 ^a	-0-	-0-
2005-06	500	-0-	41,240	-0-	-0-

^a Louisiana Innovative Technology Grant Fund

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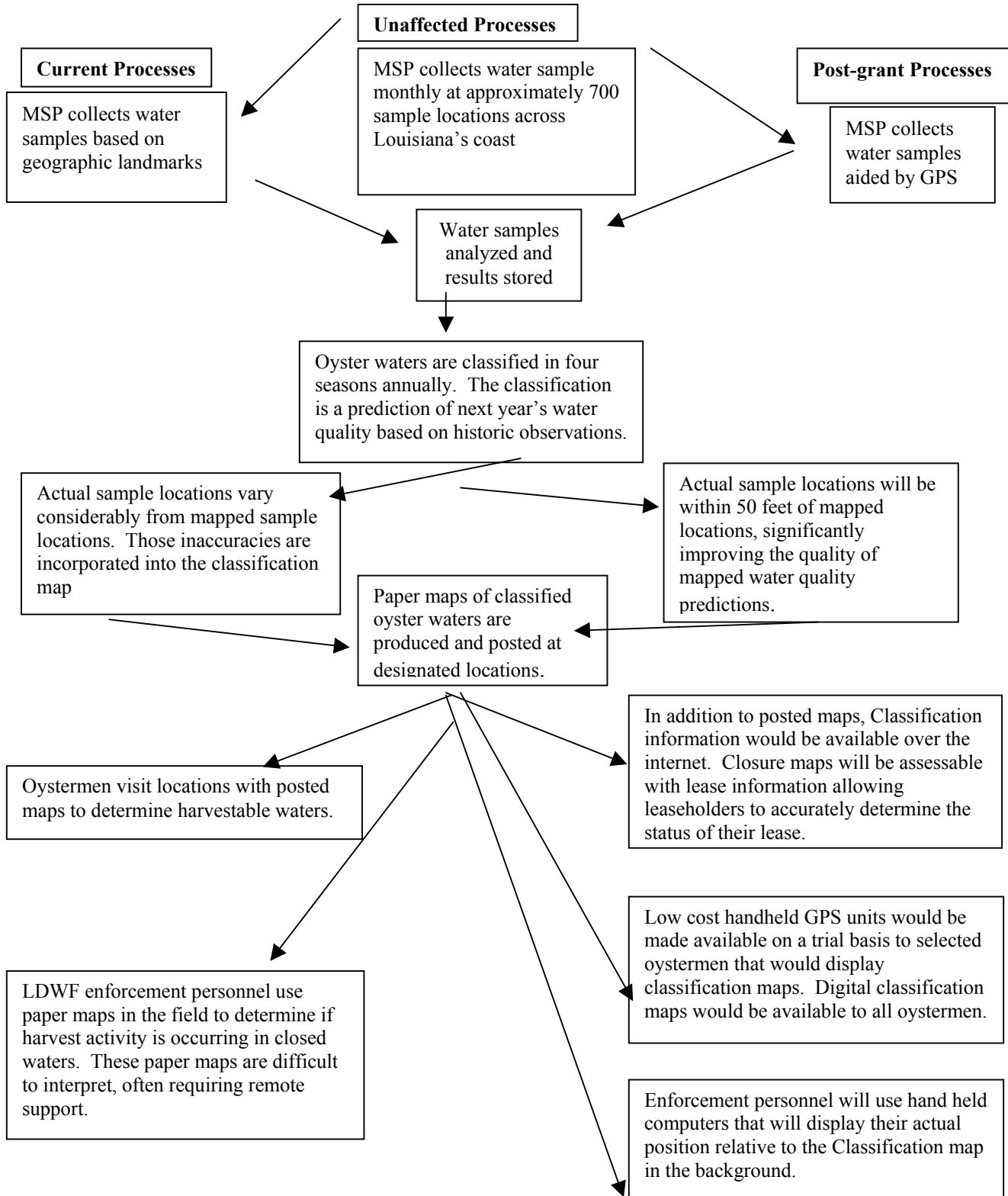


Fig. 1. Technical description flow diagram.